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Failed Spinal Anesthesia Owing to Inadvertent Dural Puncture: A Case Report

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Abstract

We describe a case of insufficient spinal anesthesia potentially owing to Cerebrospinal Fluid (CSF) leaking into the epidural area induced by Accidental Dural Puncture (ADP). A caesarean section was performed on a lady aged 28 who was carrying twins. She had been scheduled for a hybrid Spinal-Epidural Procedure (CSEA). After several ADP injections at the T12/L1 level, spinal anesthesia with hyperbaric bupivacaine 9 mg and fentanyl 15 g was delivered *via* the L3/4 interspace; however, analgesia only reached the T12 level. If bupivacaine leaked into the epidural space along with the CSF through the damaged dura, it would be responsible for the lack of analgesia. Under general anesthesia, the scheduled procedure went off without a hitch. If there is significant CSF leakage during spinal anesthesia in pregnant women following ADP, the anesthesia level may not grow as planned.

Keywords: Accidental dural puncture; Spinal anesthesia; Combined spinal-epidural anesthesia; Cerebrospinal fluid; Failed spinal anesthesia

Introduction

Post-Dural Puncture Headache (PDPH) is hypothesized to be caused by Cerebrospinal Fluid (CSF) leaking following an epidural, and Accidental Dural Puncture (ADP) is a complication of epidural anesthesia that can lead to PDPH. Here, we report on a case in which the dose of spinal anesthetic was not raised, perhaps because Cerebrospinal Fluid (CSF) leaked into the epidural space during ADP. The patient provided written informed consent for this case report to be published.

Case Presentation

A 28-year-old lady (168 cm in height and 75 kg in weight [53 kg when not pregnant]) was scheduled for a caesarean surgery under CSEA at our hospital due to her twin pregnancy.

A T12/L1 epidural catheter was attempted to be placed in the left lateral position utilizing the loss of resistance method, an 18 G Tuohy needle, and saline. When the Tuohy needle was progressed around 5 cm with a median approach, however, ADP occurred and CSF flowed forcefully. Next, an effort was made to implant an epidural catheter at T11/12, however gradual CSF leakage was noticed from the Tuohy needle. A second puncture was performed at T11/12, but CSF leakage was discovered, thus the epidural catheter was not inserted. A 25-G pencil-point needle was used to provide spinal anesthetic from L3/4. 1.8 ml of 0.5% hyperbaric bupivacaine and 16 g (0.4 ml) of fentanyl were delivered upon confirmation of CSF reflux by regurgitation at about 5.5 cm needle depth. After eight minutes in the supine head-down tilt posture, the patient's anesthetic level had only grown to T12. The patient was subsequently moved into the left lateral position and 1 ml of 0.5% hyperbaric bupivacaine was injected from L3/4. However, the patient continued to feel discomfort in the lower abdomen after 18 min, therefore the surgery was conducted under general anesthesia. The abdomen X-ray following surgery revealed no lumbar deformity. After surgery, the patient continued to experience severe headaches for more than three weeks. Two years later, the patient was scheduled for a second caesarean surgery. Spinal anesthesia was delivered with 2 ml of 0.5% hyperbaric bupivacaine and 15 g (0.3 ml) of fentanyl using a 25-G pencil point needle inserted at L3/4, attaining an anesthetic level of T5 this time.

Discussion

The patient's analgesia level was expected to spread considerably following spinal anesthesia due to the confirmed CSF backflows. However, even after repeated injection of bupivacaine, analgesia

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remained insufficient, and there might be various reasons for this. Bupivacaine may have been injected outside the subarachnoid area, notwithstanding the confirmed backflow of CSF. The CSF collected in the epidural space following dural puncture may have been aspirated into the spinal needle implanted from L3/4 and bupivacaine may have been administered into the epidural space due to a misconception that the spinal needle had been appropriately advanced into the subarachnoid space. It might have been accomplished. In this case, however, such a situation could be ruled out since the anesthetic level climbed to T12 following medication administration, indicating that pharmaceuticals were administered into the subarachnoid area, and the backflow of cerebrospinal fluid was unquestionably from the subarachnoid space. In clinical situations, even anesthetic solutions that are administered into the epidural area are not easily aspirated. Arachnoid cyst may have been one of the causes of spinal anesthesia failure [1], which would not have occurred because spinal anesthesia administered two years later was successful. A second option is that some of the bupivacaine delivered to the subarachnoid area escaped into the epidural space, leaving inadequate anesthetic in the subarachnoid space. After the patient was positioned in the supine position, the hyperbaric bupivacaine migrated cephalad in accordance with gravity and leaked through the dura injury site. We assume that a substantial volume of Cerebrospinal Fluid (CSF) spilled into the epidural area, based on the intensity of the postoperative headache [2]. The CSF exuding from the Tuohy needle at T11/12 may have been CSF collected in the epidural space that seeped through the dura injury site, since collection of CSF in the epidural space following spinal tap has been documented in both infants and young adults [3,4]. This report is limited by the absence of an MRI or ultrasound imaging confirming the accumulation of CSF in the epidural space. It has been found that continuous spinal anesthesia is beneficial for caesarean section [5]. After the second ADP, the conversion of CSEA to continuous spinal anesthesia may have been an option for anesthetic management.

In conclusion, we saw a situation in which spinal anesthesia following ADP in a pregnant lady did not produce the required amount of anesthesia. Clinicians must consider the risk that spinal anesthetic administered to pregnant women following ADP may be insufficient due to CSF leaking.

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